The specific changes to the specification and the amended claims are shown on a separate set of pages attached hereto and entitled VERSION WITH MARKINGS TO SHOW CHANGES MADE, which follows the signature page of this Amendment. On this set of pages, the insertions are underlined while the ~~deletions are stricken through~~.

Rejections Under 35 U.S.C. § 102

The Examiner has rejected Claims 1-6 under 35 U.S.C. § 102(b) or 35 U.S.C. § 103(a) as being unpatentable over JP 05311291 and JP 62093325. The Examiner has further rejected Claims 1 and 3 under 35 U.S.C. § 102(b) or 35 U.S.C. § 103(a) as being unpatentable over Arita et al.

Claim 1 as amended recites three copper alloys suitable for drawn wire or an IC lead pin for a pin grid array provided on a plastic substrate. These three alloys are an alloy of copper with Zn and Mg, an alloy of copper and Sn, and an alloy of copper with Sn and Ag. As explained below, none of these three alloys are taught or suggested by the prior art of record. For clarity, the three alloys are discussed separately below.

General Remarks

As electronics have become more widely used, smaller, and less expensive, much affort has gone into finding copper alloys which are inexpensive to produce, don't contain unnecessary elements, have high conductivity, and desirable mechanical properties. One mechanical property which has received insufficient attention is performance under repeated bending. When this property is considered along with other important parameters such as conductivity, certain specific alloys which have not previously been used for these purposes have been formulated with high performance for electrical assemblies. These alloys are the subject of the present application.

The Zn-Mg alloy

The Zn-Mg alloy is claimed in independent Claim 1 and dependent Claim 2. The Examiner has rejected Claims 1 and 2 as being unpatentable over JP 05311291 and JP 62093325.

A Zn-Mg alloy which does not also include additional elements is not disclosed in JP 62093325. JP 62093325 describes alloys containing Zn and Mg in Examples 1-6 of Table 1. Only Example 4 discloses amounts of Zn and Mg within the ranges claimed in Claims 1 and 2. However, the alloys of Examples 1-6 include additional elements besides Cu, Zn, and Mg. Since the alloys in Claims 1 and 2 are claimed as Zn, Mg, and a balance of Cu, alloys including other elements such as Fe and P are excluded from the scope of the claim. Accordingly, JP 62093325 does not teach a Zn-Mg-Cu alloy without other elements as is set forth in Claim 1, and the prior art provides no suggestion that a Cu alloy with desirable properties can be made without the addition of other elements such as Fe and P.

Furthermore, a Zn-Mg alloy which does not also include additional elements is not disclosed in JP 05311291. JP 05311291 describes alloys containing Zn and Mg in Examples 27 and 32. However, the alloys of both Examples 27 and 32 include additional elements besides Cu, Zn, and Mg. Furthermore, in these Examples, the amounts of Zn and Mg are not both within the ranges claimed in Claims 1 and 2. Since the alloys in Claims 1 and 2 are claimed as Zn, Mg, and a balance of Cu in the present invention, alloys including other elements such as Cr and P are excluded from the scope of the claim. Accordingly, JP '291 does not teach a Zn-Mg-Cu alloy without other elements as is set forth in Claim 1, and the prior art provides no suggestion that a Cu alloy with desirable properties can be made without the addition of other elements such as Cr and P.

The Sn alloy

The Sn alloy is claimed in independent Claim 1 and dependent Claim 3. The Examiner has rejected Claims 1 and 3 as being unpatentable over JP 05311291, JP 62093325 and Arita.

JP 62093325 does not disclose Sn containing Cu alloys. Accordingly, a Sn-Cu alloy is not anticipated by JP 62093325.

A Sn-Cu alloy which does not also include additional elements is not disclosed in JP 05311291. JP 05311291 discloses Sn containing Cu alloys; however, the Sn containing Cu alloys disclosed in JP 05311291 all contain several additional elements in addition to Sn and Cu. Since the alloy is claimed as Sn and a balance of Cu, alloys containing other elements are

excluded from the claim scope. Accordingly, a Sn-Cu alloy, without additional elements, is not taught by JP 05311291.

All of the alloys specifically made by Arita contain chromium, and Arita is primarily directed to chromium-copper alloys. However, Arita does disclose at Col. 1, lines 27-29, that tin-containing heat-resistant copper has been available as an alloy material for lead frames. However, the Arita reference does not state what an advantageous amount of Sn would be to produce an appropriate balance of mechanical strength and conductivity. The information Arita provides about Sn-Cu alloys indicates that prior art Sn-Cu alloys contained less Sn than is claimed in Claims 1 and 3. Arita discloses that the Sn-Cu alloys known in the art display a tensile strength of 38 kg/mm^2 and a conductivity of 84% IACS, at column 1, lines 42-46. As shown by Example 15 of the applicants specification, these values are found with alloys having a Sn content of about 0.05%. Therefore, one can infer that the Sn-Cu alloys discussed in Arita are directed toward Cu alloys containing about 0.05% Sn, which is less Sn than the claimed lower limit of 0.1% that is recited in Claims 1 and 3. Accordingly, a Sn-Cu alloy having 0.1% to 1.0% Sn is not anticipated by Arita.

Furthermore, since the alloy is claimed as Sn and a balance of Cu, alloys containing other elements, such as Cr, are excluded from the claim scope. Accordingly, a Sn-Cu alloy having 0.1 to 1.0% Sn, without additional elements, is not taught or suggested by Arita.

The Sn-Ag alloy

The Sn-Ag alloy is claimed in independent Claim 1 and dependent Claim 4. The Examiner has rejected Claims 1 and 4 as being unpatentable over JP 05311291 and JP 62093325.

JP 62093325 does not disclose Sn and Ag containing Cu alloys. Accordingly, a Sn-Ag-Cu alloy is not anticipated by JP 62093325.

A Sn-Ag-Cu alloy which does not also include additional elements is not disclosed in JP 05311291. Example 28 of JP 05311291 discloses an alloy containing 0.17 Cr, 1.50 Zn, 0.32 Ni, 0.08 Ag, 0.05 Pb, and 0.14 Sn. Although JP 05311291 discloses an alloy having Sn and Ag, the alloy also contains a number of other elements. Furthermore, the amount of Ag provided is

below the range recited in Claims 1 and 4. Accordingly, a Sn-Ag-Cu alloy, without additional elements and having Sn and Ag within the recited ranges is not taught by the prior art of record

The Fe-Zn-P alloy

The Fe-Zn-P alloy was recited in independent Claim 1 and dependent Claim 5. The Examiner has rejected Claims 1 and 5 as being unpatentable over JP 05311291 and JP 62093325. The language relating to the Fe-Zn-P alloy from Claim 1 and dependent Claim 5 have been cancelled. New Claim 7, discussed below, is now directed to drawing wire made from a Fe-Zn-P alloy.

The Cr alloy

The Cr alloy was claimed in independent Claim 1 and dependent Claim 6. The Examiner has rejected Claims 1 and 6 as being unpatentable over JP 05311291 and JP 62093325. The language relating to the Cr-Cu alloy from Claim 1 and dependent Claim 6 have been cancelled.

In view of the above, Applicant maintains Claim 1 is patentable over JP 05311291, JP 62093325, and Arita. As Claims 2-4 are dependent on independent Claim 1, Claims 2-4 are patentable for these reasons as well.

New Claim

Applicants have added new Claim 7. Claim 7 is directed to a method of making a wire from a copper alloy containing 2.1 to 2.6 wt% of Fe, 0.05 to 0.2 wt% of Zn, and 0.015 to 0.15 wt% of P, with the balance being made of unavoidable impurities and Cu, wherein the copper alloy has conductivity of 50% IACS or more, and tensile stress of 400 MPa or more but 650 MPa or less. Support for new Claim 7 may be found on Page 6, lines 8-17. Applicants submit that the prior art of record does not anticipate or render obvious a method of making a wire from a Fe-Zn-P-Cu alloy as claimed in new Claim 7. Accordingly, Applicant maintains Claim 7 is patentable over the prior art of record.

CONCLUSION

The applicant has endeavored to address all of the Examiner's concerns as expressed in the outstanding Office Action. Accordingly, amendments to the claims pursuant to statutory sections 102 and/or 103, the reasons therefor, and arguments in support of the patentability of the pending claim set are presented above. In light of these amendments and remarks, reconsideration and withdrawal of the outstanding rejections is respectfully requested.

Any claim amendments which are not specifically discussed in the above remarks are not made for patentability purposes, do not narrow the claims, and it is believed that the claims would satisfy the statutory requirements for patentability without the entry of such amendments. Rather, these amendments have only been made to increase claim readability, to improve grammar, and to reduce the time and effort required of those in the art to clearly understand the scope of the claim language. Furthermore, any new claims presented above are of course intended to avoid the prior art, but are not intended as replacements or substitutes of any cancelled claims. They are simply additional specific statements of inventive concepts described in the application as originally filed.

If the Examiner has any questions which may be answered by telephone, he is invited to call the undersigned directly. Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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Dated: 5/20/02

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

1. (Amended) A copper alloy suitable for an IC lead pin for a pin grid array provided on a plastic substrate, ~~which~~ wherein the copper alloy is selected from the group consisting of:

a copper alloy containing 0.05 to 0.5 wt% of Zn and 0.05 to 0.5 wt% of Mg, with the balance being made of unavoidable impurities and Cu;

a copper alloy containing 0.1 to 1.0 wt% of Sn, with the balance being made of unavoidable impurities and Cu; and

a copper alloy containing 0.1 to 1.0 wt% of Sn and 0.1 to 0.6 wt% of Ag, with the balance being made of unavoidable impurities and Cu;

~~a copper alloy containing 2.1 to 2.6 wt% of Fe, 0.05 to 0.2 wt% of Zn, and 0.015 to 0.15 wt% of P, with the balance being made of unavoidable impurities and Cu;~~ ~~and~~

~~a copper alloy containing 0.4 to 1.1 wt% of Cr, with the balance being made of unavoidable impurities and Cu,~~

wherein the copper alloy has conductivity of 50% IACS or more, and tensile stress of 400 MPa or more but 650 MPa or less.

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